

MULTIPLE PROCESSING CHAMBER SET AND USE THEREOF

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BACKGROUND OF THE INVENTION

Field of the Invention

The invention relates to processing chambers sets for independently and/or simultaneously processing multiple samples of biological cells in a processing device.

15 Background of the Invention

Flexible processing chambers (bags) for processing biological cells in a fixed volume centrifuge, and methods for use of such processing bags, e.g., by centrifugation, are known. For example, PCT patent application PCT/US98/10406 describes a flexible cell processing chamber having a rotating seal to keep the contents of the chamber sterile during processing. Flexible processing chambers advantageously are disposable and thus suitable for single-use sterile applications.

For certain applications, such as blood processing including blood component

separation, enzymatic conversion of blood type, and pathogen inactivation of blood components, it is desirable to process multiple units at a time, in a single instrument under the same conditions. Simultaneous processing of multiple units reduces the time and expense required to perform such applications. Present flexible processing chambers do not provide the ability to perform independent simultaneous processing of multiple samples.

One of the difficulties in constructing a multiple processing chamber set is the expression of the contents of the multiple chambers. In any processing protocol, it may be necessary to add and remove processing solutions and chemicals during several steps of the protocol. Thus, it is necessary to be able to efficiently remove the contents of the multiple chambers, usually the supernatant following centrifugation, in a manner that retains the integrity of the multiple chambers and the sterility of the contents contained therein. Accordingly, there is a need for a multiple processing chamber set for biological cell processing in a centrifugal device that maintains sterility of the processed cells and provides for efficient addition and removal of cell samples and processing solutions from multiple chambers simultaneously and/or independently.

SUMMARY OF THE INVENTION

The present invention provides a multiple processing chamber set for biological cell processing in a centrifugal device including processing bags and expression bags. The invention also provides methods for use of such a multiple processing chamber set for biological cell processing in a centrifugal device, including independent and/or simultaneous addition to or expression of contents from the multiple chambers.

According to a first aspect of the invention, multiple sample processing apparatuses for a continuous flow centrifuge are provided. The apparatuses include a plurality of axially aligned processing chambers and expressor chambers, each chamber comprising an axial opening. Preferably the chambers are connected in a fixed arrangement. The apparatuses also include a plurality of central hubs disposed in the axial openings, the central hubs constructed and arranged to define passages for fluid communication between the chambers and a fluid supply. In preferred embodiments, the processing and expressor chambers are constructed

and arranged to be flexible and expandable, preferably the chambers are constructed and arranged to releasably contact each other at a circumferential portion of the chambers when the expressor chambers are filled with an expressor fluid. The processor bag and expressor bags may be alternately arranged.

5 According to a second aspect of the invention, multiple sample processing apparatuses for a continuous flow centrifuge are which include a plurality of axially aligned, processing chambers having expressor chambers incorporated therein. Each chamber also includes an axial opening. Preferably the chambers are connected in a fixed arrangement with the expressor chamber being preferably identically shaped as the processing chamber
10 but slightly smaller to fit within the processing chamber. The apparatuses also include a plurality of central hubs disposed in the axial openings, the central hubs constructed and arranged to define passages for fluid communication between the chambers and a fluid supply. In preferred embodiments, the processing and expressor chambers are constructed and arranged to be flexible and expandable.

15 In the first aspect and other associated embodiments, the central hubs are constructed and arranged to prevent construction of an apparatus having two adjacent processing chambers. The central hubs of the processing chambers may have a generally disc-like shape with non-complementary sides, such as non-complementary male and female connector shapes. Preferably the central hubs of the expressor bags also are constructed and arranged to
20 prevent construction of an apparatus having two adjacent expressor chambers, in a like fashion. Most preferably the apparatus uses two sets of central hubs, with the shape of one side of the processing chamber central hub being complementary in shape only with one side of the expressor chamber central hub, and the shape of the other (second) side of the processing chamber central hub being complementary in shape only with the other (second)
25 side of the expressor chamber central hub.

 In other preferred embodiments, the central hubs are constructed and arranged to define multiple passages for fluid communication, preferably a number of passages that is at least equal to the number of chambers in the apparatus. Thus the central hubs, when connected together, provide continuous unique fluid passages between each chamber and one